

# Contributions to the Knowledge of the Alpheid Shrimp of the Pacific Ocean

## Part VI. *Prionalpheus*, a New Genus of the Alpheidae<sup>1</sup>

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IN THE EXTENSIVE collections of shrimp upon which this series of papers is based, there are three fragmentary specimens in which the mouth parts are entirely unlike those of any other genus of the family Alpheidae. These are of two species but, because of the fragmentary condition of the specimens, only one of the species is named. The specimens were collected in Fiji and the Society Islands while the senior author was there under a grant from the Bernice P. Bishop Museum, Honolulu. The study has been supported by grants from the National Science Foundation (NSF-G 1754 and NSF-G 3863).

### *Prionalpheus* gen. nov.

DIAGNOSIS: Body form usual, similar to *Alpheopsis*; rostrum present and small; supra-, extra-, and infracorneal teeth lacking; anterior carapace projecting to cover corneas from dorsal and lateral view, flat, not inflated to form orbital hoods; antennules and antennae normal for family; mandibles without a trace of molar process, incisor process greatly expanded and consisting of five strong teeth, the most anterior tooth of left mandible developed as an awl-shaped process that slides within almost closed tube formed by corresponding portion of right mandible; maxillulae with middle lobe moderately or greatly expanded, inner lobe bearing strong spines; maxillae reduced in size, endites greatly reduced, palp present, scaphognathite relatively small and narrow; first maxilliped with endite large and rounded, endopod without apparent segmentation, exopod well developed but without any basal exite, epipodites present; second maxilliped with basal article of endopod apparently united with basipodite and large, next

article somewhat to greatly reduced, penultimate article not greatly expanded and ultimate article rounded in outline rather than short and laterally expanded; third maxillipeds not markedly different from those of other genera; only one cheliped known, similar in form to those of *Alpheopsis equalis* Coutière; second legs with carpus divided into three or four articles; following legs slender, elongate with biunguiculate dactylus; pleura of sixth abdominal somite articulated; telson and uropods normal; no anal tubercles; branchial formula apparently including five pleurobranchs, no arthrobranchs, and epipodites only on first and second maxilliped.

TYPE SPECIES: *Prionalpheus triarticulatus*, described below.

DISCUSSION: Even without both chelae of the first pair, there can be no doubt that this genus belongs to the family Alpheidae. This is shown by the development of the sole chela on the first walking legs and the chelate second legs with a multiarticulate carpus, by the whole body form, by the development of the carapace to cover the orbits of the eyes, by the development of the antennules and antennae, as well as by less important characteristics like the form of the third legs, the development of articulated pleura of the sixth abdominal segment, and the form of the telson and uropods. If it were not for the unique development of the mouth parts, these species would fall into the genus *Alpheopsis* without modification of the generic description.

However, no mouth parts like these have been described for any species of any genus of the family. In Coutière's thesis (1899: 153-173) the mouth parts of the members of the family were shown to have little variation, with the possible exception of the third maxilliped. No subsequent publication has shown any greater differences in the inner mouth parts, although

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Chace did erect a new genus *Pomognathus* (1937: 124, fig. 5) on the basis of a species with an expanded third maxilliped. In *Prionalpheus* the differences lie principally in the overdevelopment of the incisor process portion of the mandibles, with the corresponding loss of the palp and molar portion, and in the seemingly primitive condition of the second maxilliped, which, although it has coalescence of some of the articles, assumes a form more reminiscent of the maxilliped of Mysidacea than those of most other Decapoda. The development of the maxillulae differs in the two species, and the modification of the maxillae and of the first and third maxillipeds are not as striking. The inclusion of this genus within the family Alpheidae will necessitate changes in its definition as given by Couzière ("Mandibles toujours profondément bipartites, 'palpe' à deux articles. . . ." 1899: 322).

As stated above, except for the development of the mouth parts, this genus is most similar to *Alpheopsis* within the family. Of course, without the chelae it is difficult to decide where its affinities lie, but even if they were present and similar to those of *Alpheopsis* as they are expected to be, it would still be difficult to assign this genus to any phylogenetic scheme for the family. It is generally accepted that *Athanas* is the most unmodified genus, and *Alpheus* and *Synalpheus* the most highly modified, on the basis of both the orbital hoods and development of the large chela; such a scheme would leave *Alpheopsis* in an intermediate position. However, *Prionalpheus*, intermediate in most characteristics, is not intermediate in the modification of the mouth parts.

The species of *Alpheopsis* available in the collection, including *Alpheopsis equalis* Couzière, *A. diabolus* Banner, and *A. tetrarthri* Banner, have been re-examined to determine if they have this modification of mouth parts. They do not. However, two species described by Couzière, *A. idiocarpus* and *A. fissipes* (1908:4), should also be re-examined; *A. idiocarpus* especially appears to be similar to *P. triarticulatus*.

It is unfortunate that the specimens were so few in number, because a number of characteristics should be investigated more thoroughly by dissection. For example, the origin

of the peculiar tooth on the ventral side of the body at the base of the antennules should be studied; the branchial formula should be determined more carefully; the mouth parts of the right side should be compared to those of the left. With only three specimens representing two species, it was decided to leave the specimens intact for future workers.

Little can be said of the distribution of these species. All three were collected from the usual collecting site for snapping shrimp, the reef flat and the outer portion of the reef, in Fiji and Tahiti. No special niche or commensal association was noted for them, yet these three specimens were the only ones found in all of the collecting trips to similar habitats in these and other islands, collections that produced about eight thousand specimens. Presumably, these species must have special environmental requirements, but what the requirements may be we cannot say.

The generic name is derived from the Greek, *prionos*, meaning "saw"; the gender is masculine, as it is in *Alpheus*.

#### KEY TO THE SPECIES

- Carpus of second legs with three articles; only scattered setae on terminal article of third maxillipeds, these not reaching over half the length of that article.....  
 .....*Prionalpheus triarticulatus*  
 Carpus of second legs with four articles; terminal article of third maxillipeds bearing numerous setae equal in length to that article.....  
 .....*Prionalpheus* species

#### *Prionalpheus triarticulatus* sp. nov.

##### Fig. 1

TYPE AND ONLY SPECIMEN: A 10.7 mm. non-ovigerous female (3.9 mm. carapace length) collected in middle of reef flat on fringing reef, Korolevu, Vitilevu, Fiji, by senior author, 17 March 1954 (BF-13).

DESCRIPTION: Rostrum triangular, base demarcated from adjacent margin of carapace, tip acute, reaching to end of first antennular article, and bearing four short setae; dorsal surface with slight carina. Anterior carapace obscuring eyes from dorsal and lateral views, but not from

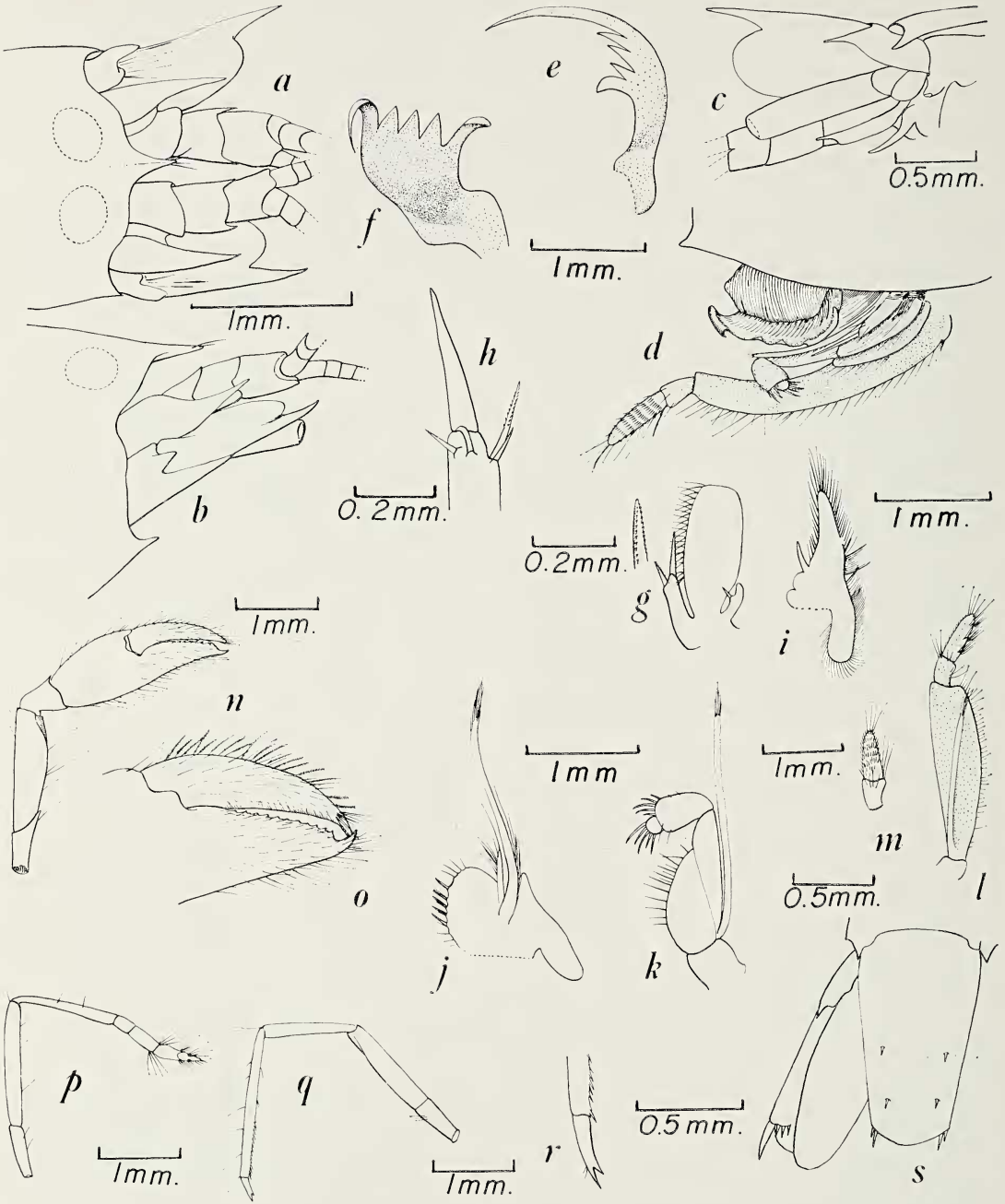


FIG. 1. *Prionalpheus triarticulatus* Banner. *a, b*, Anterior body region; *c*, base of antenna and antennules, in situ, ventral view; *d*, mouth parts of right side, medial view, showing groove on anterior end of mandible; *e*, left mandible, posterior view; *f*, left mandible, medial view; *g*, first maxilla, with enlargement of teeth on bristle; *h*, first maxilla, inner lobe, side opposite of *g*; *i*, second maxilla; *j, k, l*, first, second, and third maxillipeds; *m*, distal articles, inner face, third maxilliped; *n*, chelipeds, lateral view; *o*, fingers of chela; *p*, second leg; *q*, third legs; *r*, third leg of dactylus; *s*, telson and uropods.

ing swollen orbital hoods; without trace of ocular teeth; pterygostomial tooth produced and acute.

Basal articles of antennules short and heavy, with second article slightly broader than long; lateral spine of stylocerite strong, with tip reaching slightly beyond end of second antennular article. Ventral lateral tooth of basicerite heavy, acute, and curving under scaphocerite; superior lateral margin of basicerite projecting as a rounded lobe; scaphocerite with strong lateral spine, slightly curved towards tip, and reaching beyond end of antennular peduncle, squamous portion broad and anteriorly rounded, reaching to end of antennular peduncle; carpo-cerite equal in length to antennular peduncle. Either basal article of antennules or of antennae, or sclerite at their bases on ventral side of head bearing a sharp, acute tooth (see Fig. 1c).

Mouth parts protrudent and conspicuous in lateral view. Mandible large, curved distally and flattened laterally, bearing five teeth; posterior tooth acute, longer than middle teeth and curved; three middle teeth strong, acute, and of equal size; anterior tooth of left mandible awl-shaped, curved, almost 4 times the length of middle teeth and fitting into almost closed groove developed by corresponding tooth of right mandible; no trace of palp or *pars molaris*. Maxillulae with middle lobe greatly expanded, 2.2 times as long as broad, exceeding the inner lobe by 0.7 of its length, distally truncate with rounded corners, and bearing two series of setae on inner margin; inner lobe short, obliquely truncate, and bearing strong terminal spine almost as long as article and four other shorter spines, one curved; outer lobe smaller than inner and bearing a single weak spine. Maxillae reduced in size with total length of scaphognathite equal to length of maxillule; endites reduced to small lobes; palp without segments and bearing only few setae; setiferous scaphognathite narrow, with posterior lobe only 2 times as long as broad. First maxilliped with endite rounded, solitary (unless basal endites were lost in dissection), bearing four strong articulated spines and a few setae; endopod with no apparent segmentation, bearing few setae; exopod well developed; epipodite well developed, lobe-

like, rounded. Second maxilliped apparently with only four articles distal to articulation of exopod; basal article of endopod with maximum length twice the breadth, inner margin bearing strong spines; next article with maximum length 0.7 that of basal article; penultimate article broader but shorter than preceding article, bearing setae; ultimate article half as broad and one-quarter as long as penultimate, bearing five strong articulated spines. Third maxillipeds normal for family, with ultimate article twice length of penultimate, 0.3 length of basal article, and bearing few short scattered setae along margins.

Only one of first pair of legs present. Ischium 0.3 length of merus; merus 4 times as long as broad, unarmed, bearing few scattered setae; carpus somewhat cyathiform, distally expanded to accommodate base of propodus; palm slightly shorter than fingers, 0.7 as long as broad, somewhat compressed; fingers heavy, fixed finger bearing fine serrations, dactylus with straight cutting edge, free margin armed with setiferous bristles; tips of fingers crossing.

Second legs with merus 7 times as long as broad; three articles of carpus with ratio 10:2:3, first article 0.8 as long as merus, twice as wide distally as proximally; fingers and palm of chela subequal, together 1.4 times as long as distal article.

Third legs with ischium 0.4 length of merus, bearing three setae; merus 5 times as long as broad, unarmed; carpus 0.9 as long as merus, also unarmed; propodus 1.4 times length of merus, about 15 times as long as broad, armed with short, very fine spines and setae along inferior margin; dactylus biunguiculate, with inferior unguis the heavier and shorter.

Telson 2.8 times as long as broad distally, 1.5 times as broad proximally as distally, sides with uniform taper, tip broadly arcuate, dorsal and terminal spinules small. Uropods narrow; tooth on proximal article small; distal tooth on outer uropod heavy, flanked by three smaller teeth.

DISCUSSION: The origin of the spine on the ventral side of head could not be ascertained without dissections which would ruin the type

specimen. It appears to arise from an inner portion of the base of the antennae.

This species will be contrasted to *Prionalpheus* species under that form. It is superficially similar to *Alpheopsis idiocarpus* Coutière, a species that may be found to be in this genus when it is re-examined; the two species differ, however, even if the mouth parts should be found to be similar, in the biunguiculation of the dactylus of the third leg. *Alpheopsis fisisipes* Coutière, which may also be found to belong in this genus, differs in the number of articulations of the carpus of the second legs.

The specific name refers to the number of articles of the carpus of the second leg.

*Prionalpheus* sp.

Fig. 2

LOCALITIES: 1 female, nonovigerous, carapace length 2.8 mm., total length 5.6 mm., from Arue, Tahiti, in dead coral heads 5-10 ft. deep (BD-3); 1 ovigerous female, carapace length 3.7 mm., total length 10.6 mm., from outer edge of fringing reef at Korolevu, Vitilevu, Fiji (BF-16); both collected by senior author. Tahitian specimen with one second and one third leg intact; Fijian specimen with only second legs intact.

DESCRIPTION: Base of rostrum not demarked from curvature of anterior margin of carapace, tip of rostrum reaching to middle of first antennular article and bearing four setae; pterygostomial angle somewhat produced and acute, but not projecting as a definite tooth.

Antennular peduncle short and heavy, with second article about as long as broad; stylocerite reaching almost to end of second antennular article; outer flagellum bearing numerous heavy, but not stiff, setae. Ventral lateral spine of basicerite acute but shorter than that of *P. triarticulatus*; dorsal lateral lobe present; lateral spine of scaphocerite reaching to middle of third antennular article, rounded edge of squamous portion to end of second article; carpocerite reaching to end of antennular peduncle. No ventral spine anterior to labrum at bases of antennules or antennae.

Left mandibles similar to that of *P. triarticulatus* except anterior awl-shaped tooth only

twice as long as adjacent tooth, and posterior tooth not acute but rounded; anterior process of left mandible fitting into corresponding groove of right mandible. Maxillulae of more normal form, as shown in Figure 2e; inner lobe bearing numerous strong, hooked setae. Maxillae similar in form to those of *P. triarticulatus*, but with posterior portion of scaphognathite more slender. First maxilliped with curvature of endite less uniform; exopodite bearing laterally a heavy setiferous bristle (broken in specimens); epipodites greatly reduced. Second maxilliped with endopod composed of only three conspicuous articles, one being very short and sandwiched between the first and third; basal article more rectilinear than that of *P. triarticulatus*; penultimate article pear-shaped in outline, about 1.3 times as long as maximum breadth, bearing numerous heavy spines; tip half-round in outline, bearing six strong spines. Third maxillipeds similar in conformation to those of *P. triarticulatus* but with all three articles of endopod bearing heavy setae, the setae of last article being equal in length to article.

First legs lacking on both specimens. Carpus of second legs with four articles bearing the ratio 10:2.6:1.8:4.4; chela somewhat longer than distal carpal article, fingers and palm subequal. Third legs with ischium unarmed; merus 4 times as long as broad; carpus 0.9 as long as merus; propodus 1.2 times as long as merus, armed distally with few weak spines; dactylus biunguiculate.

Telson 2.1 times as long as posterior margin is broad, 1.2 times as broad anteriorly as posteriorly, lateral margins almost straight, posterior margin strongly arcuate; only one pair of dorsal spinules, located posterior to middle; inner pair of spines at posterior lateral margin half as long as posterior margin is broad. Only one tooth on basal article of uropod; distal shoulder of outer uropod armed with one strong lateral spine and three flanking spines each almost as long as lateral spine.

DISCUSSION: Even without the first legs, these specimens may be distinguished with ease from *P. triarticulatus*. Among more readily apparent differentiating characteristics, this species has (1) margins of the rostrum which are confluent with the anterior margin of the carapace;

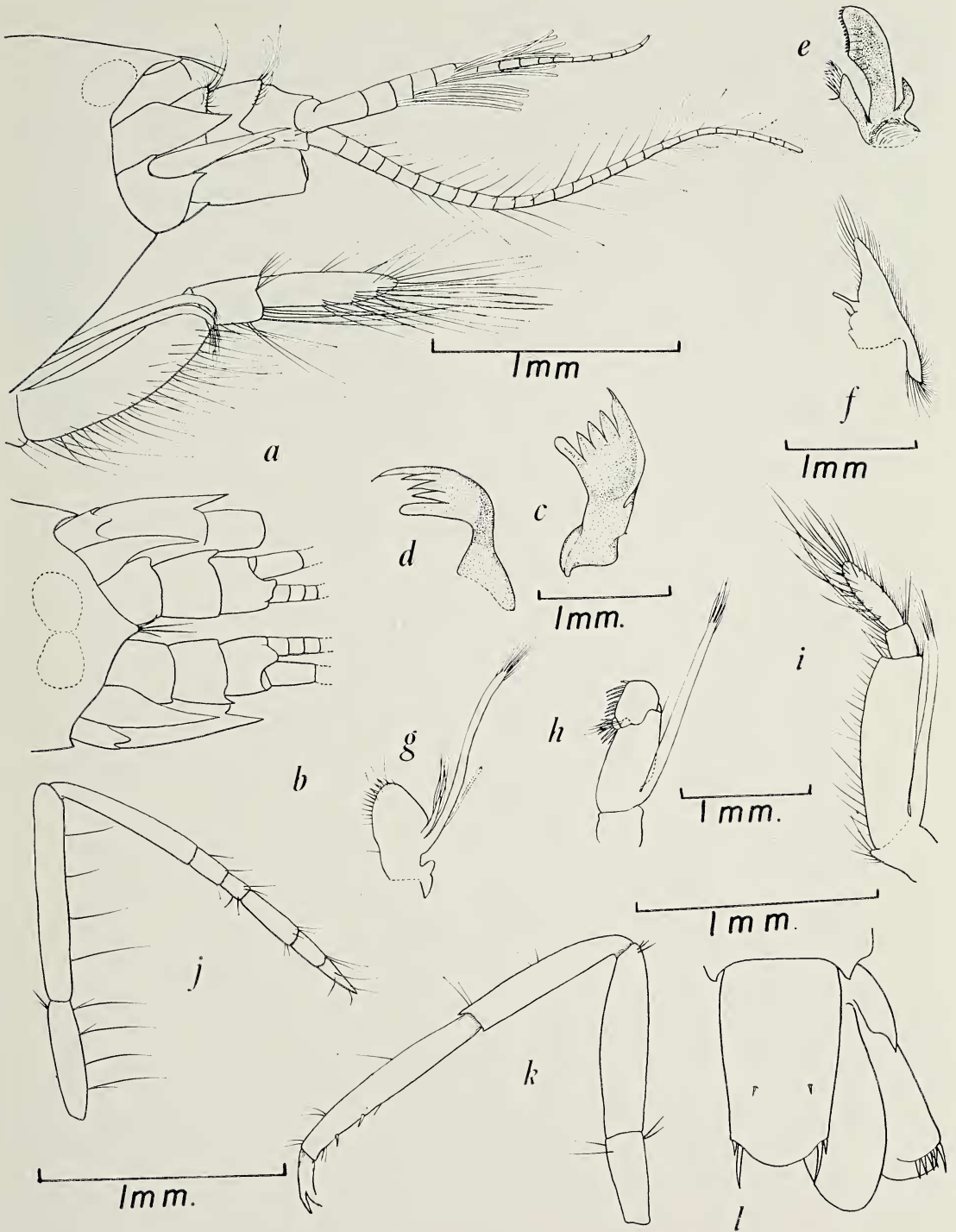


FIG. 2. *Prionalpheus* sp. *a*, *b*, Anterior body region; *c*, *d*, left mandible, median and posterior views; *e*, *f*, first and second maxillae; *g*, *h*, *i*, first, second, and third maxillipeds; *j*, second legs; *k*, third legs; *l*, telson and uropods.

(2) a pterygostomial angle which is less pronounced; (3) shorter scaphocerites and ventral lateral teeth of the basicerites; (4) more hirsute third maxillipeds; (5) four, rather than three, articles in the second legs; (6) a telson which has a different armature. In the mouth parts, the differences in form of the mandibles, the maxillulae, and the second maxillipeds are striking, as can be seen by comparing the figures. Whether the differences in length of the stylocerites, in the form of the third legs, and in the armature of the telson and uropods are significant cannot be determined without more specimens.

The species has been left unnamed because the specimens are so incomplete.

## REFERENCES

- CHACE, FENNER A. 1937. The Templeton Crocker Expedition, VII. Caridean Decapod Crustacea from the Gulf of California and the West Coast of Lower California. *Zoologica*, N. Y. 22(2): 109-138, text figs. 1-9.
- COUTIÈRE, HENRI. 1899. Les "Alpheidae," Morphologie, externe et interne, formes larvaires, bionomie. Thèses présentées à la Faculté des Sciences de Paris. . . . Sér. A, No. 321 (No. d'ordre 980). Masson et Cie., Paris. 599 pp., 409 text figs., 6 pls. (Also in: *Ann. Sci. Nat.* VIII, Zool. 9: 1-560.)
- 1908. Sur quelques nouvelles espèces d'Alpheidae. *Soc. Philom. Paris Bull.* IX, 11(5): 1-26.